

# Wastewater Disposal

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LAKE ERIE ECONOMIC REGION

WATER MANAGEMENT SYMPOSIUM

on the

WATER CYCLE

Paper on

WASTEWATER DISPOSAL

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Wastewater Disposal

Man today faces one of his greatest challenges in the conceiving and developing of systems for the handling and disposal of water and other used material resources. We in Ontario have entrusted the management of water distribution and quality to the Ontario Water Resources Commission. In its early days the Commission faced an enormous backlog in construction of needed municipal services, and in the first decade of its existence managed the expenditure of one billion dollars for water supply and pollution abatement programs. Over this ten year period, problems with industrial wastes, changes in agriculture and land use, disposal of solid wastes, and other related practices have become an increasing concern to the Commission. We regard the problem of quality control in our waterways from a very broad perspective - involving anything that may impair water quality.

Water quality impairment results from many causes both man-made and natural. To examine all of these before this gathering would perhaps be redundant bearing in mind the background of the delegates and the fact that you are well informed people. The effects of pollution are many and varied, involving both public health and economic considerations. Oxygen depletion in natural waters, the often spectacular polluting effects of toxic

chemicals and oil pollution, temperature changes, more subtle and long lasting chemical changes resulting from materials imparted from waste disposal systems, industrial and mining activities and land drainage, are several examples of the water quality changes that result. Specific reference will be made by Dr. Ayres later in the symposium to problems associated with agriculture - the effects of erosion, pesticides, fertilizers and problems arising from confinement production of livestock and poultry - all of these are real problems requiring careful study and control. Management clearly implies decision making and action by man, but cannot include those activities over which he is unable to exercise control. For example, producers of agricultural products will be able to do much to control the quality of natural waters on their lands - other control practices may require the attention and assistance of the community at large, while there will remain many aspects of nature that will defy man's control.

The quality of water determines its usefulness. An abundant supply will be of little economic value if polluted. Therefore, quality is of vital importance to all water users. As we continue to grow and demands for water increase, the preservation of its quality will become a more complex problem. Water will be increasingly withdrawn for repeated use as it passes from the headwaters of river basins toward eventual discharge into the Great Lakes and our other major

drainage systems. Each cycle of use causes some degradation in quality and of course some impairment results from natural causes. In our water pollution control philosophy, we attempt to recognize the many forces that bear on this involved situation. There will always be the problem of incremental quality deterioration and it behooves us to fully comprehend the meaning of this as we continue to apply measures aimed at the management of water quality. The natural purifying capability of water is a great resource upon which we must continue to rely, providing we recognize that this capacity cannot be exceeded without the development of undesirable quality conditions. This clearly implies that as the competition for use of our rivers and lakes increases, less and less of the available waste assimilating capacity of these waters will be available for each user. It is essential that we develop improved waste treatment methods to meet these anticipated restrictions on future use of our river systems. Here we see in vivid terms the implication of the water-use cycle and the limitations of use that will probably be required.

The Commission's water quality investigations extend into all the heavily used river basins of the province as well as the Great Lakes into which these basins discharge. Currently, a detailed up to date inventory is being made of the major water-use practices in the basins tributary to the lower lakes. As well as accounting for the total waste water inputs to lakes Erie and Ontario, assessments are

being made of the effects of land use and other water use practices that are reflected in the quality of the tributary streams draining the major basins. Extensive studies of wastewater assimilation and dispersion in the Ontario waters of the lakes are proceeding where impairment has been demonstrated. The purpose of these investigations is to develop information and plans for the comprehensive management of water in our drainage basins. We are now on the threshold of this work, in many cases only commencing the necessary studies and programs on sections of river basins where intensive use is occurring.

In addition to the three-vessel navy employed on the Great Lakes, the Commission is using other survey techniques in its war on water pollution. Aerial photography is used to help evaluate wastewater and river dispersion in the lakes. Also, flights are run regularly to detect oil discharges and other offences in the river basins and shore waters of the Great Lakes.

The Commission extends its supervisory and enforcement roles into the management of other related areas that bear on water quality preservation. These include: the engineering approval and supervision of municipal plans for water supply and waste disposal, approval of industrial waste treatment programs, subdivision development review and enforcement of the pollution prevention provisions of the OWRC Act.

In its role as a utility, the Commission serves the people of Ontario by making both financing and water and

sewage services available. Under the Provincial ownership program announced in 1965, service will be sold to users on the basis of units of consumption. By this arrangement the Commission will construct and operate central water supply and waste treatment systems for the benefit of municipalities where this service has been heretofore lacking.

There are many technical problems associated with pollution abatement. The rational design of wastewater treatment systems requires studied forecasts of quality under conditions of drought. On occasions, the distribution of water for waste assimilation and dilution is lacking and natural river flows must be augmented to improve the water quality. We are continually developing knowledge of drought streamflows and relating this information by use of the latest numerical analysis techniques to forecasts of changes in natural water quality. Armed with this knowledge for specific river basins, designs for improved sewage works and industrial waste treatment facilities then become possible.

A problem receiving increasing attention today is the so-called nutrient or fertilizer input to our rivers and lakes. Nutrients which are comprised of basic chemical salts and compounds are found in land and agricultural drainage, industrial waste effluents and in treated discharges from municipal sewage works. In the latter case, residual components in the treated effluent contribute to the food supply of aquatic life in streams and lakes. We are told



that nitrogen is also transported in significant amounts through precipitation from the atmosphere into surface waters. Evaluation and prediction of the concentrations of many of these materials in streams is possible, however, economical methods for removing them from used water are lacking at the moment.

As agriculturalists, we must develop improved management practices to control soil erosion and resulting sediment pollution, and remedial measures that will minimize losses of plant nutrients to streams. Careful selection and application of pesticides as well as better animal wastes management procedures are also required.

The concept of regional water management is an important one. Presently, we have been able to make a basic but vital start on many of the problems that extend beyond municipal boundaries to affect neighbouring localities. By developing our knowledge to take into account water use needs throughout a river basin and designing water quality control facilities compatible with desired quality and uses, we will have taken a long stride in the direction of regional development and service.

In the eventual development of water quality management programs it will become possible to make vastly improved assessments of the effects of natural and man-made influences on any given body of water. Because of the complexity of the problem, comprehensive planning on entire river basins, taking into account the many uses

and related quality needs, will be required to develop sound economic water management programs. By careful measurements of the effects of sun, wind and rain, the engineer will be able to provide better guides and designs to ensure the best quality possible with the funds available.

We have an excellent example of the fruits of regional planning in the London pipeline. In this case, water is being diverted from a distant basin for use in the Thames River Basin and eventual discharge into the lower lakes. Re-use of this water by others is a certainty. We must ensure that the quality is such after use that those downstream will be able to enjoy an uninterrupted supply. When man has lived up to this type of stewardship commitment, the water resources will have been restored and renewed for subsequent use cycles. The challenge is with us now to develop the understanding and necessary mechanisms to achieve this objective.



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